IMAGE SENSOR HAVING PHOTO DIODE AND METHOD FOR MANUFACTURING THE SAME

Related Applications

This application is a divisional of copending U.S. application serial number 10/345,852, filed on January 16, 2003, now Patent No. 6,734,471 the contents of which are incorporated herein in their entirety by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an image sensor having a photo diode and a method for manufacturing the same, and more particularly, to an image sensor having a photo diode for improving sensibility, junction leakage, and electron capacity, and a method for manufacturing the image sensor.

2. Description of the Related Art

A pinned photo diode is used for a complementary metal-oxide semiconductor (CMOS) image sensor, which is manufactured by CMOS processes, or a charge coupled device (CCD) image sensor to detect light for generating and accumulating photo electrodes. Since the pinned photo diode is formed in a PNP or NPN junction structure buried in a substrate, the pinned photo diode is referred to as a buried photo diode. The CMOS image sensor is subject to less power consumption than the CCD image sensor and is manufactured by a simpler process. Moreover, the CMOS image sensor can be formed together with a signal processing circuit in one chip, making it attractive as a next-generation image sensor.

The CMOS image sensor having the above-described pinned photo diode will be briefly described with reference to FIGS. 1 and 2.

FIG. 1 is a circuit diagram of a unit pixel Pix in a conventional image sensor, made up of one photo diode PD and four MOS transistors. The source (or drain) of a transfer transistor Tx is connected to the photo diode PD, and the source of a reset transistor Rx is connected to the drain (or source) of the transfer transistor Tx. A floating-diffusion capacitor Cfd is formed between the drain (or source) of the transfer